

APPENDIX B
PIPELINE RECOVERY PROCEDURES

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B1 Leave in place

- The pipeline is purged of contents, typically by pigging operations, and the residual contents are properly disposed.
- If the pipeline is to be decommissioned and maintained for future use they are filled with a suitable fluid. Fluids used in decommissioned pipelines are typically treated with an oxygen scavenger, a biocide, corrosion inhibitors and other specific additives depending on the pipeline metallurgy, prior service and anticipated length of time until the pipeline is recommissioned.
- After the pipeline is filled with fluid, the ends are capped by divers. Typically pipelines that were not buried will be covered by sediment over a period of time, providing some protection.

B2 Bury/Trenching

- The pipeline is purged of contents, typically by pigging operations, and the residual contents are properly disposed.
- If the pipelines are to be decommissioned and maintained for future use they are filled with a suitable fluid. Fluids used in decommissioned pipelines are typically treated with an oxygen scavenger, a biocide, corrosion inhibitors and other specific additives depending on the pipeline metallurgy, prior service and anticipated length of time until the pipeline is recommissioned.
- After the pipeline is filled with fluid, the ends are capped by divers.
- Burying or trenching methods are the same as those used in installation of a new buried pipeline. ROVs operated from supply vessels will be used for this operation. The pipeline will typically be buried 2-4 meters beneath the seabed.

B3 Reverse Lay Recovery

- The pipeline is purged of contents, typically by pigging operations, and the residual contents properly disposed.
- Divers cold cut the riser above the tube turn and below the tube turn with a guillotine saw or similar equipment.
- Pipe is recovered with a winch through a stinger to the recovery vessel and the tensioners in the stinger system are utilized to secure the pipe when it is severed.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.

- The pipe is retrieved onto the barge until approximately 80' extends beyond the clamp assembly. At this point chain slips shall be placed on the pipe, by the clamp, and the pipe secured in the clamp. The pipe is then be cut with a hydraulic shear, the clamp released and the chain slip used to pull the next section of pipe aboard the recovery vessel. In water depths greater than 150' larger section lengths of pipe can be removed for each cut.
- The cut pipeline segment is placed on a material barge for demobilization.
- The suspended portion of the pipeline takes an "S" bend configuration between the stinger and the seabed. This shape must be carefully controlled to avoid buckling distortion. If the sea conditions exceed certain limits, the recovery operation is stopped and the pipeline may be temporarily released from the recovery vessel to prevent it from buckling.
- At the termination platform the barge will make one cut below the tube turn and recover the remaining pipe.

B4 Reverse Reel Barge recovery

- The pipelines is purged of their contents, typically by pigging operations, and the residual contents properly disposed.
- Divers cold cut the riser above the tube turn and below the tube turn with a guillotine saw or similar equipment.
- The pipe is recovered with a winch through a stinger at the recovery vessel and the tensioners in the stinger system are utilized to secure the pipe when severing.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.
- The recovered pipe is wound onto the reel on the barge (rather than being cut into sections as with the lay barge) for reuse or disposal onshore.
- The suspended portion of the pipeline takes an "S" bend configuration between the stinger and the seabed. This shape must be carefully controlled to avoid buckling distortion. If the sea conditions exceed certain limits, the recovery operation is stopped and the pipeline may be cut and temporarily released from the recovery vessel to prevent it from buckling.
- When capacity of the reel is met (depending upon pipe diameter, a reel barge can carry several thousand feet of pipeline), the pipe is cut with a hydraulic shear and the pipe is allowed to rest on the seabed while the barge transports the reel to shore.
- At the termination platform the barge will make one cut below the tube turn and recover the remaining pipe.

B5 Long Section Barge Recovery

- The pipelines is purged of their contents, typically by pigging operations, and the residual contents properly disposed.
- The pipe is suspended from davits mounted on one side of a recovery vessel.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.
- As the vessel moves slowly along the route of the pipeline, the sling lengths are adjusted so that the pipe is lifted in a controlled “S” bend configuration to avoid buckling. This shape must be carefully controlled to avoid buckling distortion. If the sea conditions exceed certain limits, the recovery operation is stopped and the pipeline may be temporarily released from the recovery vessel to prevent it from buckling.
- The end of the pipe is fed through a cutting station near the bow of the vessel and the pipe cut into convenient lengths for shipping ashore in a supply boat.

B6 Tow Recovery

- The pipelines is purged of their contents, typically by pigging operations, and the residual contents properly disposed.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.
- The pipe is suspended from davits aboard the recovery vessel. The vessel carries tensioners and stinger systems at both ends, with the cutting station mounted in the middle of the vessel.
- The pipeline is lifted onto the forward stinger and passed through to the aft stinger.
- A towing head and floatation buoys are attached as the pipe is moved aft. The towing head is picked up by a tug which maintains tension on the buoyant pipeline as the recovery vessel retrieves additional pipe. When the desired towing length is reached, usually a few thousand feet, the pipeline is severed on board the recovery vessel and the freed length of pipeline towed away for re-use or disposal. The process is then repeated.
- The buoys are calculated to provide sufficient buoyancy for the pipeline to be towed on or close to the seabed, close to the surface or at a level between. The depth the pipe is towed at depends on the sea state and condition of the seabed at the time of the operation.

B7 Short Section Recovery

- The pipelines is purged of their contents, typically by pigging operations, and the residual contents properly disposed.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.
- The pipeline is cut into short lengths on the seabed using a submersible remote operated vehicle (ROV), robots, or divers.
- Cut lengths of pipe are lifted onto the recovery vessel by crane. (Alternatively, the pipeline is lifted by davits and cut into single or double joints on the barge).
- Pipes are then transported to shore for re-use or disposal.

B8 J-Lift Recovery

- The pipelines is purged of their contents, typically by pigging operations, and the residual contents properly disposed.
- Divers cold cut the riser above the tube turn and below the tube turn with a guillotine saw or similar equipment.
- Pipe is recovered with a winch through a stinger at the recovery vessel and the tensioners in the stinger system will be utilized to secure the pipe when severing.
- A jet sled, plough or other device operated from a separate barge is used to uncover the pipe during removal operations. The device will run approximately 300 – 400 feet ahead of the barge.
- The tensioners and stinger are mounted on a nearly vertical derrick and the stinger extends down into the sea through a central moon pool in the vessel. This avoids the excessive “S” bend stresses in pipelines that result from the pipeline’s extra weight in very deep water.
- When pipeline is on the recovery vessel, the pipe will be cut with a hydraulic shear and the pipe segment placed on a material barge for demobilization.
- At the termination platform the barge will make one cut below the tube turn and recover the remaining pipe.